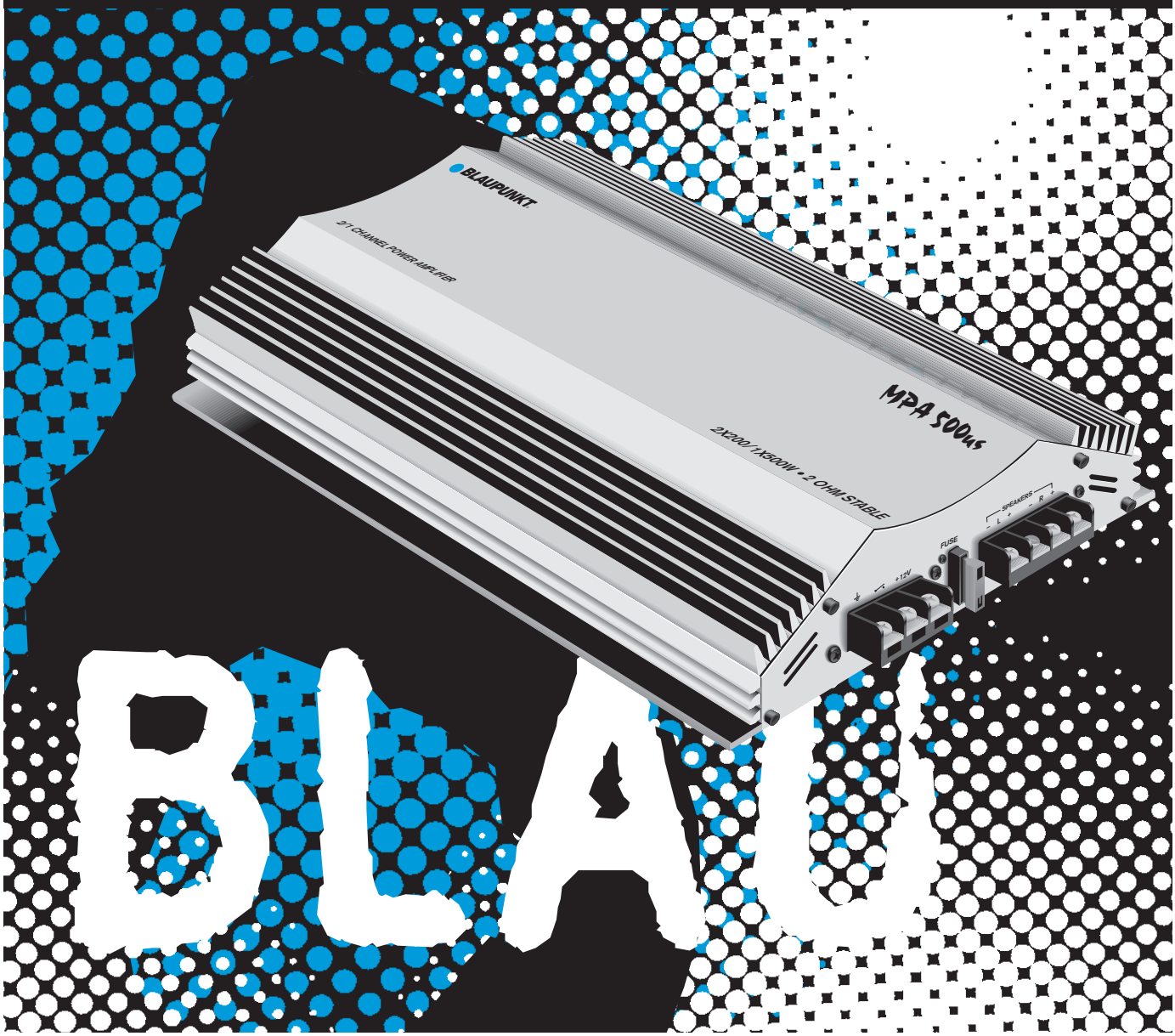
MPA MULTI-CHANNEL POWER AMPLIFIER



MPA 500us

2/1 Channel Mobile Audio Amplifier with 500 Watts Max. Power

Amplificateur audio mobile de 500 watts de puissance maximum à 2/1 canaux

Amplificador Móvil de Áudio de 2/1 Canales con Potencia Máx. de 500 vatios

Amplificador Móvel de Áudio de 2/1 Canais com Potência Máx. de 500 Watts

BLAUPUNKT®

Bosch Group

Blaupunkt Specifications - MPA500us, 2/1 Channel Amplifier

Below is a basic trouble-shooting guide to assist in seeking out and correcting a problem that may occur in the installation process. Although lengthy, this chart cannot address every single problem possible but mainly the ones most common.

PARAMETER/FEATURE	VALUE
Channels	2/1 (3 in passive bridged mode)
Size (W x H x D)	8.69 x 2.19 x 11.82 inches (220 x 56 x 300mm)
Weight	6.8 lbs (3.1 kg)
Crimping style speaker terminals?	YES
Maximum terminal wire size	8 ga.
Subsonic filter	YES (10 Hz)
Separate front/rear or left/right gains?	NO
Spade type auto fuses?	YES
Speaker short, short to +12V, and short to ground protection?	YES
High, low, and reverse voltage protection?	YES
Power output transistors	High current, bipolar outputs
Switching power supply transistors	High-Speed, MOSFET's
Minimum speaker impedance	2 ohms (non-bridged mode only) 4 ohms ONLY in bridge mode
PERFORMANCE DATA	**VALUE**
Rated power output @ 0.1% THD	
2 channels into 4 ohms / 2 ohms	2 x 100 W / 2 x 130 W
1 channel into 4 ohms	1 x 270 W
Total Harmonic Distortion @ rated full output	0.06% THD
Rated Signal/Noise ratio (averaged value)	> 90 dBA
Measured @ full rated power	105
Measured @ 1 watt / 1 kHz	85
Damping factor	>100
Frequency response (full-range mode)	20 - 50,000 Hz
High-pass crossover frequency limits	50 - 500 Hz (continuously variable control)
Low-pass crossover frequency limits	50 - 250 Hz (continuously variable control)
Input impedance	20 kOhms
Input signal voltage control range	0.3 - 4.0 Vrms
Current draw for undistorted output @ 14.4 VDC	
@ full undistorted output, non-bridged	31.0 A (2 ch x 130 W x 4 ohms)
@ full undistorted output, bridged mode	51.0 A (1 ch x 350 W x 4 ohms)
@ 33% of undistorted power (full "music" power)	18.5 A (2 ch x 50 W x 4 ohms)
@ idle	0.5 A
Minimum battery voltage to maintain rated power	12.6 Volts DC
Usable battery voltage	10 - 18 Volts DC
Trigger line voltage range	10 - 18 Volts DC
Trigger line current draw	< 15 mA draw
Turn on delay time	@ 1.5 seconds
Thermal shutoff temperature (averaged heat-sink exterior temperature)	170°F (80° C)

NOTE: DUE TO ONGOING PRODUCT IMPROVEMENTS, DESIGN AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT ADVANCED NOTICE TO THE CONSUMER OR RETAILER.

Thank You for choosing Blaupunkt!

Congratulations! You are the now the owner of an exceptional car audio amplifier from the audio enthusiasts at Blaupunkt. Our engineering staff has spent considerable time refining our MPA series amplifiers in order to introduce great sound to the consumer at an affordable price. With these products we focus on sonic performance but balanced with rugged design and flexible installation.

Not only do we offer you a great product but also a supportive owners manual. This manual can be used as a teaching guide due to its brief, but informative, explanations of amplifier and system design. We are also very concerned about the end consumer using proper installation techniques for the highest performance possible from their new audio products. MOST important to us are the concerns with safety and the installation process. Since our Blaupunkt retail dealers have the tools and experience for an optimized and safe installation, we always recommend they do the final vehicle integration. But, should you choose to install these products yourself, please take the time to read this manual completely and abide by all precautions.

What is an Amplifier?

An amplifier, by definition, is a device that receives a small audio signal on its input and reproduces it with larger voltages (or current) on its output. Ideally there should be no modifications of the signal other than to make the signal larger either in voltage or current levels. If there are changes in the signal character it is considered a "distortion" of the input signal and in most cases undesirable. With the added power of an amplifier you can play your system at higher volume levels without worrying about such distortions that actually can damage the speakers and your ears (assuming of course that the amplifier is NOT grossly over-driven).

The perfect amplifier will be able to reproduce any output voltage regardless of input signal level. But, infinite output voltage is impossible due to upper limits created by the voltages found in a car, typically 12-15 volts DC. In order to achieve undistorted power levels beyond about 20 watts per channel a switching power supply MUST be used to step up the voltage "rails" inside an amplifier.

Amplifiers are rated in "watts" of audio output power but there are often references to "rms" power and "MAX" power. Rms power is considered as "clean power" since it is undistorted power that is used for reproducing quality sound at all but the highest listening levels. "MAX" power is the most power the amp will produce when driven deep into distortion. MAX power is considered usable power only by the more "aggressive" listener since the original waveform is so distorted that it is uncomfortable to listen to for most people. Regardless of the consumer's listening habits, we dual list these power levels so everyone has an understanding of what they are purchasing.

Key Features

Your new Blaupunkt MPA series amplifier, although a simple product, offers some important features. These include:

- "Multi-Mode" operation allowing for combined stereo high-pass/bridged mono subwoofer low-pass output capability.
- 2 ohm stability (in non-bridged mode) for paralleling two, 4 ohm speakers.
- RCA inputs (low level) allowing for your typical aftermarket radio signal level outputs.
- Modular inputs (high level) for tapping off of the speaker outputs of a factory radio for example to derive a subwoofer signal for an add-on subwoofer speaker system.
- Internal low pass filters for easily deriving a subwoofer system without an add-on crossover that increases system complexity and the potential for noise.
- Variable frequency low-pass and high-pass filters (on upper MPA models) for custom tailoring the crossover frequency choice for any vehicle.
- Efficient heat-sink design to quickly wick away heat thus ensuring a life time of reliability.
- Simple mounting system for ease of installation.

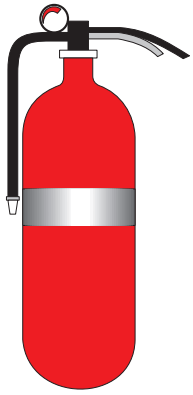
Safety Concerns

We always recommend you have your Blaupunkt amplifiers professionally installed but the installation process is often so easy that the average consumer can achieve success with little trouble. Regardless of the person installing, you should be sure to review the following points before proceeding with the installation:

- **READ THE MANUAL!** Understanding the product and installation limitations before lifting a screwdriver.
- **WEAR SAFETY GLASSES AT ALL TIMES** - Flying debris are always dangerous.
- **PROTECT THE VEHICLE** - Always disconnect the negative battery cable before starting any kind of installation work. This prevents a possible high current electrical short (potential fires).
- **HEAT** - Keep all audio components away from nearby hot vehicle components that heat up over time such as hoses, high current wires, and braking system components.
- **GIVE YOURSELF LOTS OF TIME** - Rushing to complete an installation nearly always ends up with problems.
- **DO NOT LISTEN AT HIGH SOUND LEVELS FOR A PROLONGED TIME** - these amplifiers, used with high efficiency speakers from ANY manufacturer, have the potential to cause permanent hearing loss after listening at maximum volume levels for several hours.

Installation Warnings!

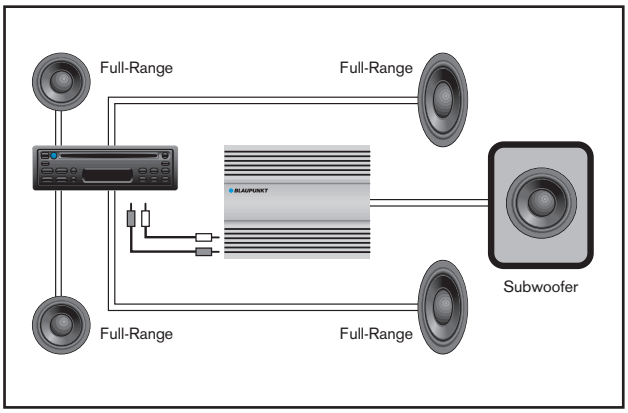
Before disassembling your beautiful new car you need some basic installation knowledge and skill with common hand and power tools. Following such basic installation tips and warnings will prevent possible damage to the vehicle and also prevent possible fires.



- **AGAIN...READ THE MANUAL!** There is a lot of helpful information in this manual that will save time and prevent problems later.
- **COVER THE VEHICLE WORK AREAS** - Use fender covers or blankets to protect the work areas from scratches or dings.
- **DISCONNECT THE (-) LEAD ON THE BATTERY** - No sparks or fires please!
- **"REVIEW" THE INSTALLATION** - Before using any tools or moving vehicle components, take five minutes to review the installation intentions (e.g., verify that an amplifier will fit in an area of a car before tearing out all the interior).
- **"REVIEW" THE VEHICLE** - Before drilling any holes or cutting into any surfaces, make sure there are no fuel or hydraulic lines behind the surfaces. Also make sure there are no wires routed directly behind or near the desired mounting area (remember...screws can often extend 1-2 inches behind the mounting surface).
- **ENSURE PROPER FIT** - Before cutting or drilling, make sure the amplifier will physically fit in its desired location. Check for clearance around rear deck torsion bars or other structural elements.
- **EVERY CAR IS ASSEMBLED DIFFERENT** - Every auto manufacturer uses different assembly techniques. Take care in removing/modifying all trim panels and mounting surfaces since they often use unique screws or snap fasteners that are difficult to replace if they are lost or broken.
- **BE CAREFUL WITH CABLE ROUTING** - When routing audio cables, make sure RCA and speaker wires are routed away from high current power lines for audio amplifiers and vehicle systems lines when possible. This will help prevent noises from creeping into the audio system, plus prevent potential damage to the vehicle wiring itself.
- **BE CAREFUL WITH ALL CONNECTIONS** - When making connections, make sure each connection is clean and properly secured. Observe all polarity markings carefully to ensure proper end performance.
- **CAUTION - FUEL TANKS AND FUEL LINES ARE NOW LOCATED DIRECTLY BENEATH THE REAR DECK IN MANY CARS - CHECK FOR ADEQUATE CLEARANCE BEFORE EVEN CONSIDERING SUCH A MOUNTING LOCATION!**

System Planning

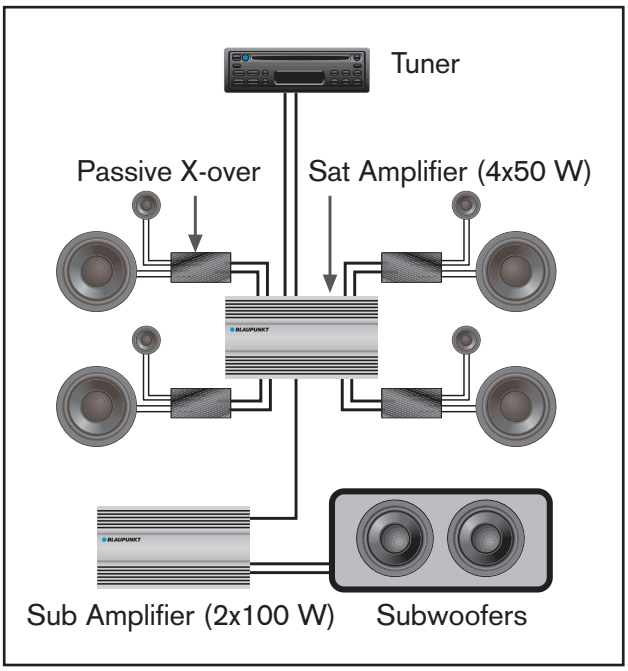
Before wiring up an audio system that may not achieve the sound quality you want, be sure to choose a system concept that fits your listening requirements. Basic systems, a receiver with internal 4x20 watts and 4 coax speakers, are adequate for many listeners. But, when you want to really "feel" the music, you will need some kind of subwoofer amplifier/speaker combination. Although many people might jump into an "add-on" amplifier to power to rear coaxial speakers, a better choice is usually a subwoofer amp/speaker system that supplements the existing 4 speaker system as shown in the adjacent drawing. Such a system provides a surprising improvement in sound quality due to the usually dramatic increase in bass response.



Supplementary subwoofer system

The next dramatic step up in performance is with a "multi-channel" system that offers more dynamic range in the mids and highs due to higher power plus more bass response due to multiple woofers and/or more power. But, with such a system, the stereo image and overall listening experience usually becomes much more life-like due to better tonal quality midrange/tweeter speakers and usually better placement.

To build such a system though, complexity goes up due to the addition of passive or active crossovers which take time to install and may inject noise into the system due to potential noise signal pick up. The results though of such a system can be dramatically pleasing.

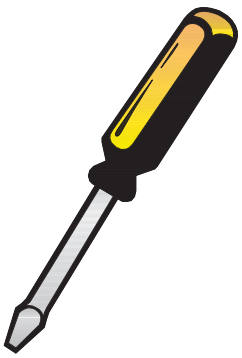


High performance multi-channel system

Installation Tools

For most installations, simple hand tools are adequate to install an aftermarket amplifier. Depending upon the mounting locations used, you will need power tools for drilling and cutting plastics and metal. A good starting list is summarized below:

- Tape measure and ruler
- Marking pen and starting punch
- Phillips and flat blade screwdrivers (small and medium sizes)
- Nylon wire bundle ties
- Pliers: standard vice-grip and needle nose styles
- Light-duty trim pry-bar for removing door trim
- Cutting shears or nibbling tool for cutting thin and medium gauger metal
- Wire cutters, wire strippers, electrical tape, crimping pliers and appropriate crimp-on terminals
- Power drill with appropriate sized drill bits



Vehicle Wiring

VEHICLE FUSING

For safety purposes, a high current fuse (or circuit breaker) MUST be installed in line with the amplifiers(s) immediately at the battery to prevent vehicle damage should the battery line in advertently shorted to the vehicle chassis. The chart at the right shows the recommended master fuse sizes for an average audio system with noted "rms" output power levels.

System Fuse Chart
(Fuse size for total amplifier system power in "rms" watts)

	100 W	200 W	500 W	1000 W
Fuse Size (in amps)	20 A	30 A	50 A	100 A

POWER WIRING

Most vehicles built since 1990 have adequate current capability for your amplifier. Except for systems above about 500 W rms, the factory charging system and battery should easily support it if properly installed. Proper wire size must be chosen to ensure adequate current delivery to the amp. Wire size (gauge) of the cables need to increase in size for higher power systems. (Wire sizes larger than those noted are usually a waste of time and money since they offer Little or no performance improvements.)

Wire diameter must increase (decreased wire gauge number) for higher power systems. For long wire runs the wire diameter must also increase. The wire sizes noted allow for a maximum 0.5 volts DC drop over the give wire run which results in Sound Pressure Level drops inaudible to the average listener.

System Power and Ground Wire Chart
(Wire gauge for total system in 'rms' watts)

Wire Length	100 W	200 W	500 W	1000 W
5 ft. / 1.5 m	12	10	8	4
10 ft. / 3.0 m	12	10	8	4
15 ft. / 4.5 m	10	8	6	2
20 ft. / 6.0 m	10	8	6	2
25 ft. / 7.5 m	10	8	4	0 or 00

SPEAKER WIRING

As with power wire, speaker wire size (gauge) changes with the power required and the length of the wire run. The speaker wire chart shows the minimum recommended wire size for a single audio output channel driving a loudspeaker at a given distance with a maximum power loss of 0.5 dB, the threshold of audibility. (Wire sizes larger than those noted are usually a waste of time and money since they offer little or no performance improvements.)

Loudspeaker Wire Chart
(Wire gauge per loudspeaker/speaker power in "rms" watts)

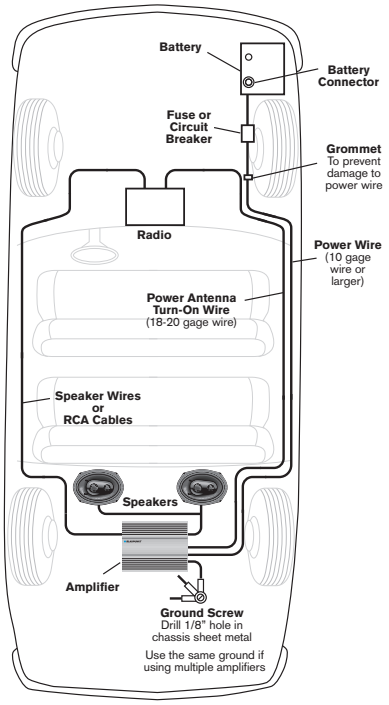
Wire Length	20 W	50 W	100 W	200 W
5 ft. / 1.5 m	18	16	16	16
10 ft. / 3.0 m	18	16	16	16
15 ft. / 4.5 m	16	16	16	14
20 ft. / 6.0 m	16	16	16	14
25 ft. / 7.5 m	16	16	14	12

FINAL VEHICLE WIRING

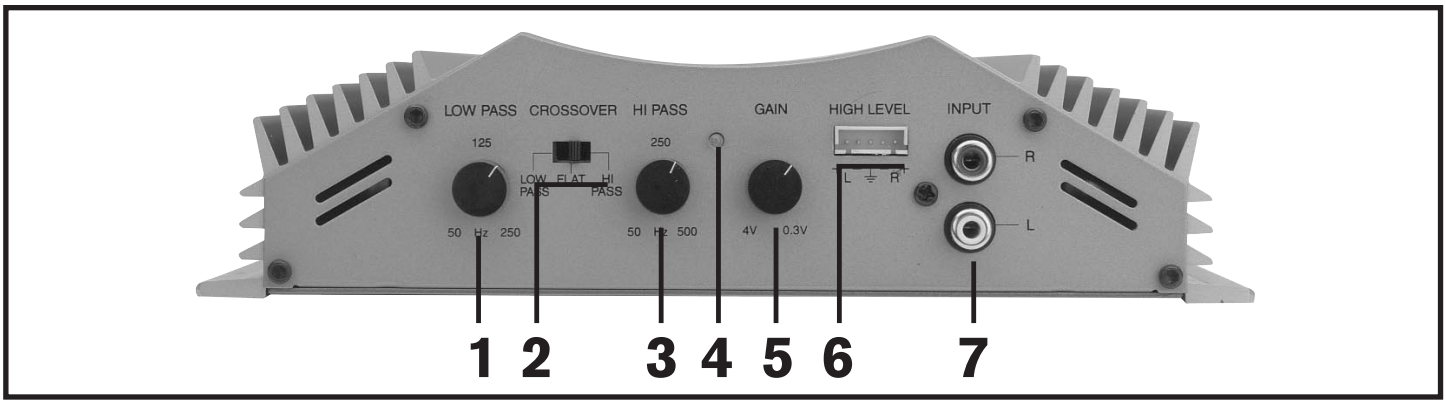
Current requirements for an upgraded audio system dictate a dedicated power line be run from the amplifier directly to the battery of the vehicle. This line should NOT be run to the fuse panel of the vehicle but directly to the battery. DO NOT run to the alternator either. There MUST be a fuse installed at the battery with adequate amperage as shown in the chart above.

As for the final signal wiring, be sure to route the audio cables down the side of the car opposite the power lines to avoid noise pick up from the lines. Also, try to route all audio cables away from noise sources such as engine computers and ABS brake computers.

Proper power grounding is important to insure adequate current flow. Be sure to grind the surface clean of all paint to ensure a solid electrical connection.



Inputs & Controls



The inputs and controls for this amplifier are explained in the summaries below and reference the numbered call-outs above.

1.) **LOW-PASS CROSSOVER CONTROL** - Once the "crossover frequency setting" is set to "LOW-PASS", this control adjusts the frequency for which all signals BELOW this setting are passed on to the speakers.

2.) **CROSSOVER FREQUENCY SETTING** - the internal crossover frequency control setting of the amplifier can be switched to either the "flat" frequency response position or in a high-pass/low-pass mode. On this amplifier, the choice is for either 50-250 Hz in LOW-PASS mode or 50-500 Hz in a HIGH-PASS mode.

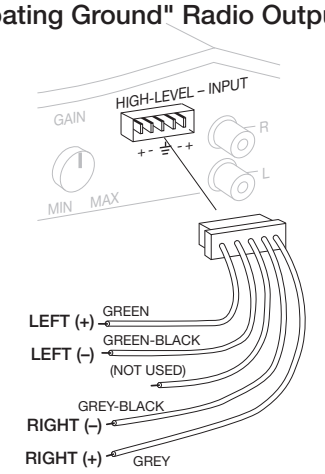
3.) **HI-PASS CROSSOVER CONTROL** - Once the "crossover frequency setting" is set to "HI-PASS", this control adjusts the frequency for which all signals ABOVE this setting are passed on to the speakers.

4.) **POWER "ON" LED** - This light will turn on when the amplifier receives a +12 volt turn on signal from the radio in the vehicle. The input line to the "trigger" connection must be properly connected to the radio's trigger line which is often also the power antenna line. If the amp is properly wired, but the light does not turn on, verify the trigger line is properly connected, is receiving +12 volts, and the speaker outputs are not shorted to themselves or ground in any way.

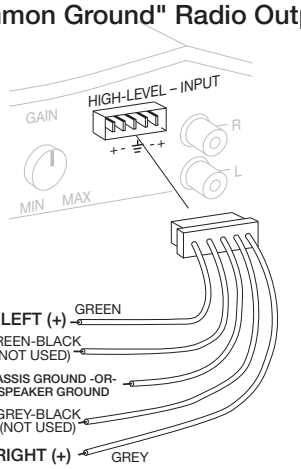
5.) **INPUT GAIN CONTROL** - This controls the gain setting on the input of the amplifier. For high gain settings (0.3 volts), this says that it takes ONLY 0.3 volts to drive the amp to full output. For low gain settings (near 4 volts), this says that it takes nearly 4 volts to drive the amp to full output. If the amp is often going into distortion at only moderate volume settings on the radio, rotate this control towards the 4 volts setting to reduce the distortion.

6.) **HIGH LEVEL INPUTS** - Should RCA cables not be available from the radio you are able to tag onto the audio signal from the high level speaker outputs of the radio. This is most commonly used when the amp is an add-on device such as for a subwoofer system.

"Floating Ground" Radio Outputs



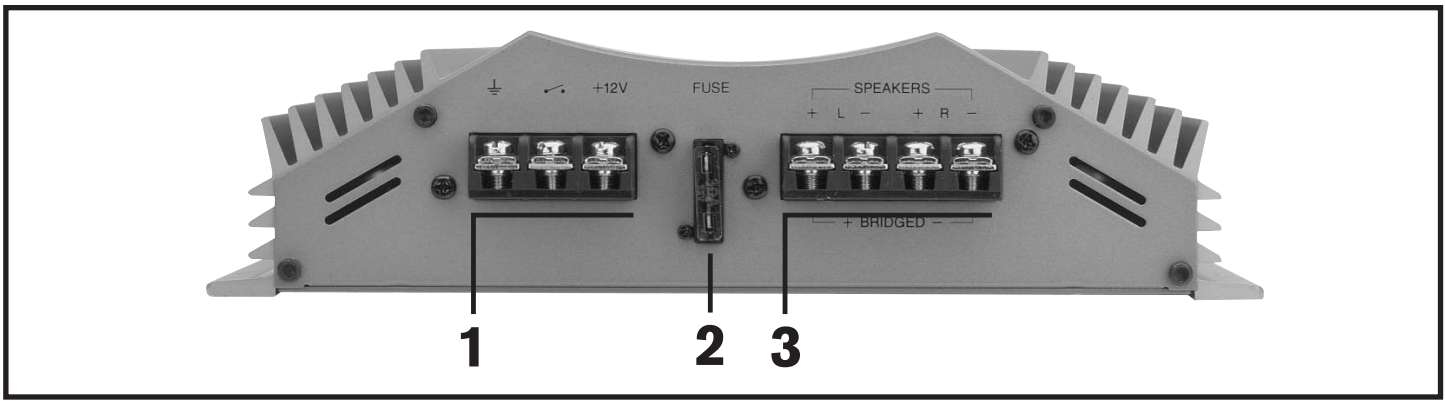
"Common Ground" Radio Outputs



High Level (Speaker Input) Wiring

7.) **LOW LEVEL INPUTS** - The more commonly used inputs, these are connected to the standard RCA outputs available on nearly all aftermarket radios today. These lines are dedicated to left and right outputs of the radio, be it for front or rear speaker installations. The input gain settings of the amplifier (0.3 - 4 volts) are referenced to these inputs.

Power Connections & Speaker Outputs



The power and speaker connections for this amplifier are explained in the summaries below and reference the numbered call-outs above.

1.) POWER CONNECTIONS -

GROUND - This is the high current ground connection to the chassis of the car. It should be fastened to a clean ground connection in the car, capable of handling high current loads and within 3 feet (absolutely no longer than 3 feet).

TRIGGER - This allows the amp to be remotely switched on from the radio and normally uses a dedicated "trigger" line output. If one is not available, simply use the power antenna line. When a +12 volt DC signal is applied it will turn on the amplifier.

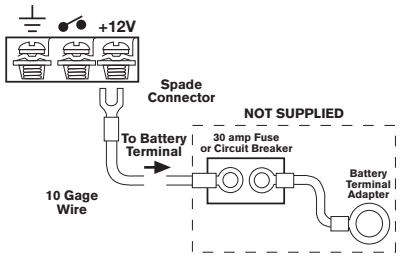
+12V - A high current line run directly to the battery is required. This line should NOT be connected to the fuse block of the vehicle. It MUST be fused through its own dedicated fuse at the battery.

2.) **FUSE** - This fuse is only for catastrophic situations should the amplifier begin to self-destruct or incur installation situations where gross amounts of current are being required from the amplifier. Although another fuse is located at the battery, in line with the battery high current line, this fuse MUST remain in the circuit to physically protect the amplifier.

3.) **SPEAKER OUTPUT CONNECTIONS** - These connections are used to connect to the loudspeakers with the appropriate impedance. It is imperative that these lines NOT be connected or touch the chassis of the vehicle in any way. Also, the (+) and (-) leads are in no way inner connected so the left channel (+) and the right channel (+) must remain independent. In addition, the (-) leads for the speakers CANNOT touch or be wired to the ground lead of the amplifier; these are NOT common ground amplifiers.

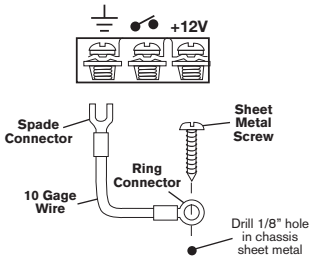
Power Terminal (+12V)

Connect directly to the vehicle battery + terminal with 10 gage wire (minimum)



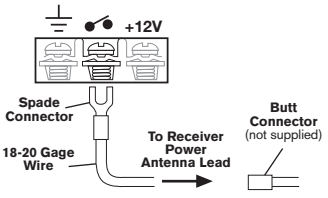
Ground Terminal ⏚

Connect to a good chassis ground. The ground connection should be clean, unpainted metal to provide a good electrical connection.



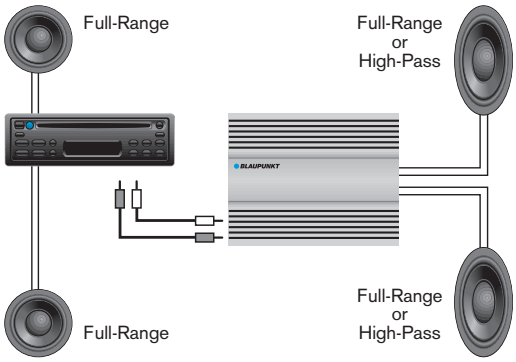
Remote Terminal

Connect the radio power antenna lead from the receiver to the amplifier terminal. This turns the amplifier on whenever the receiver is turned on.

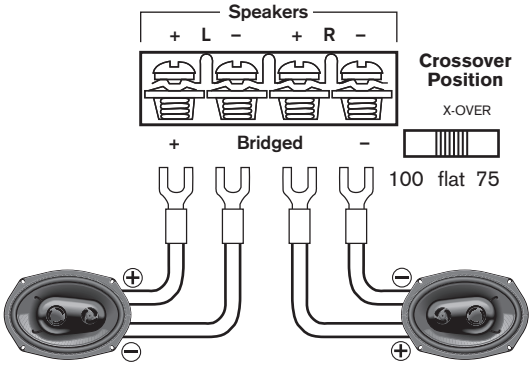


Important
If wiring connections are made wrong, the unit will not operate properly and it could be damaged. Follow the installation instructions carefully, or have the installation handled by an experienced technician.

System Configuration #1



Connect Speakers as shown. For best sound, always make sure to connect + to + and - to -



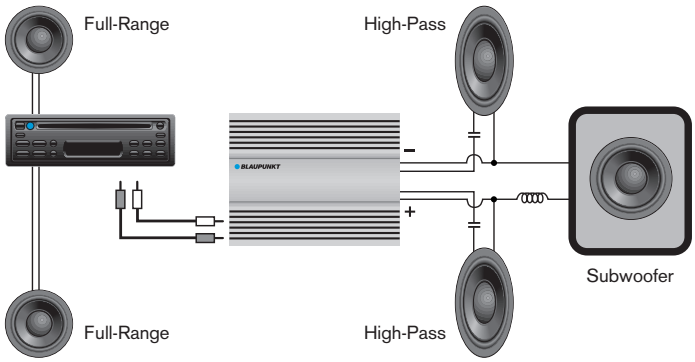
2 Channel Full-range -or- High-Pass Mode

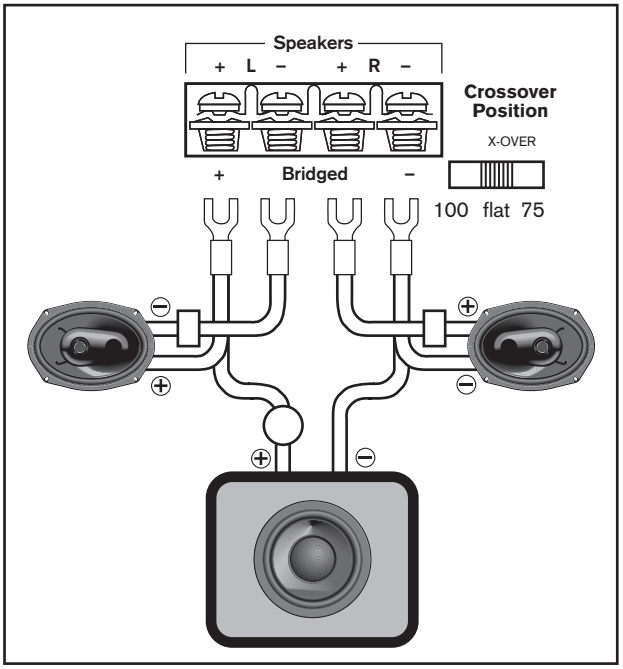
This installation is most popular for listeners who want to simply increase the power to the rear speakers in a car. The resulting performance is most commonly a louder overall sound field from the rear.

But, such a system's biggest benefit is the additional bass response since the bass control of the radio can be turned up without distorting the amplifier. Such a system is not necessarily louder in the mids and highs but is able to play louder in the low frequencies due to this additional power. This leads to an overall richer and stronger sound experience for the listener without additional subwoofer boxes or electronics that may complicate the system or take up more room. Such a system WILL NOT equal the performance of a subwoofer system but will certainly be a pleasant improvement.

With the addition of a high-pass filter, this amplifier is set up to complement a dedicated subwoofer amplifier/speaker system. This allows for smaller (e.g., 5" or 6") satellite speakers to operate most efficiently without being over-driven in the bass region where a dedicated subwoofer system operates most efficiently.

System Configuration #2



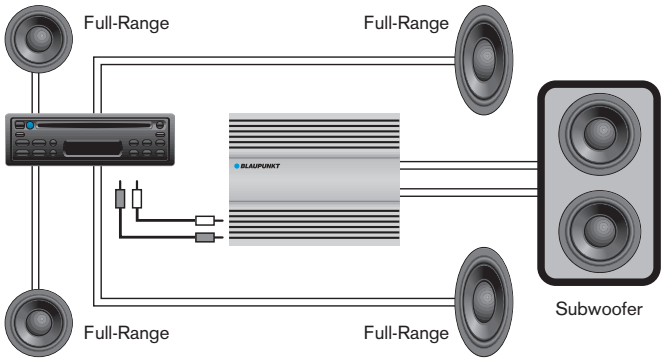


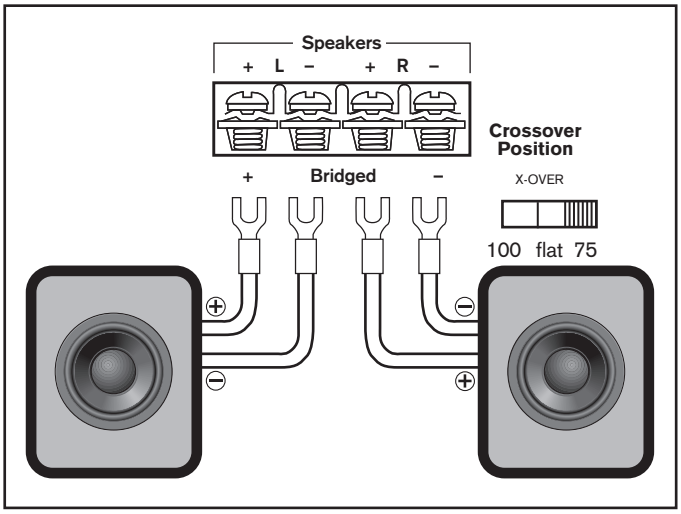
3 Channel Multi-Mode (Passive)

The multi-mode system is a "poor-man's" satellite/subwoofer system. This amplifier is able to drive speakers in stereo mode and at the same time drive low frequencies to a dedicated subwoofer speaker. By inserting inductors (coils) and capacitors, the result is an inexpensive solution to generating a '3' channel system with a 2 channel amplifier.

Using passive components (coils and capacitors) the installation is simple and performs adequately for most listeners. Such a system will not perform as well as an "active" system because the slow attenuation (roll-off) of the frequency response resulting in a moderate amount of over-lapping of the sound spectrum between the satellites and subwoofers. It is important to remember that although surprisingly pleasant performance is achieved, this is a compromise system and will NOT perform as well as a dedicated 3 channel system with electronic crossovers.

System Configuration #3



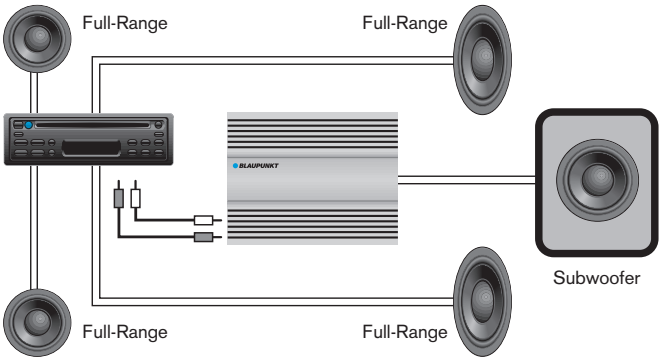


2 Channel Dual Subwoofer Mode

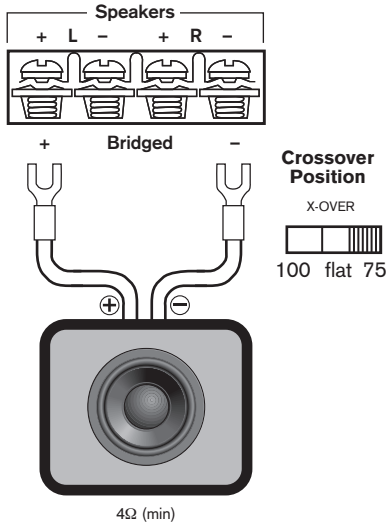
The largest improvement in sound quality always comes when adding some kind of subwoofer via a dedicated subwoofer amplifier and electronics crossover. The electronic crossover ensures minimal overlap of the bass response with the mid and high frequencies from the other speakers resulting in a more accurate performance compared to conventional coaxials with additional power.

By installing this amplifier in the stereo mode, you are able to drive two subwoofer speakers and in to low impedance loads (e.g., 2 ohms) without over heating the amplifiers. Also, such an installation more easily supports a standard 2 speaker woofer box that may already be constructed. Since two woofers can play 6 decibels louder than one at a given power (due to acoustical laws of "mutual-coupling"), the resulting sound pressure level is substantial. This is probably the most common use for a conventional two channel amplifier there is.

System Configuration #4



For higher output, you can connect a subwoofer to two output channels. Look for the + and – to indicate the correct connections.



1 Channel Bridged Subwoofer Mode

By electrically connecting a subwoofer speaker in the way shown above, you are able to greatly increase the output power delivered from the amplifier to the speaker. Such a circuit increases the voltage "swing" across the speaker which increase the power seen by a factor of 2 to 4 times that in stereo mode.

This is a very logical set-up for systems that are space limited to allow for only one subwoofer in a vehicle. The number and box volumes are compensated by simply more amplifier power pushing a single speaker.

Such a configuration is also a surprisingly good performer. These increases in power are always welcome but you must take care to avoid low impedances (below 4 ohms) since most amplifiers will overheat and shut down if over-driven into such a configuration. You must also take care that you are not exceeding the thermal, or excursion, power limiting values for the woofer. Surprisingly high power levels can be achieved with such a system without realizing it thus quickly damaging the woofer.

Trouble-shooting Guide

Below is a basic trouble-shooting guide to assist in seeking out and correcting a problem that may occur in the installation process. Although lengthy, this chart cannot address every single problem possible but mainly the ones most common.

SYMPTOM	PROBABLE CAUSE OR CORRECTION
No power (power light not on)	■ Check connections to amps +12 volt, ground, and remote lines. ■ Use voltmeter to verify voltages are at terminals of amp. ■ Check main power connection at battery. ■ Check fuse in power line at battery. ■ Disconnect all speakers but not power lines - if unit then turns on, a speaker short or speaker line touching vehicle chassis is likely.
Power but no sound (power light is on)	■ Check all input cable lines for connection. ■ Disconnect speakers from amp, test speaker lines with digital voltmeter to verify >2 ohms per channel (non-bridged mode).
No sound from one channel or entire side	■ Check radio's balance and fader control positions - verify they are at center. ■ Check speaker connections at amp and speaker. ■ Check input leads for connection to amp.
Very low sound level	■ Verify radio balance and fader controls are at center positions. ■ Check amplifier's input gain control setting - adjust for higher output levels if necessary (gain settings closer to 0.3 volts). ■ Receiver may have very low output voltage levels - a step up "line driver" may have to be used.
Power amplifier turns on and off repeatedly (motor-boating sound)	■ Make sure power connections at batter are tight. ■ Verify battery voltage is >11.5 volts DC (12.5-15V engine on) at amplifier with engine off. ■ Check all radio and amplifier ground connections.
Amplifier turns off during loud or distorted passages	■ Input stage being over-driven - lower input gain (closer to 4 volt setting). ■ Verify battery voltage is >11.5 volts DC at amplifier with engine off. ■ Check all radio and amplifier ground connections. ■ Verify speaker loads >2 ohms on all channels (non-bridged mode).
Amplifier performs fine but gets very hot to the touch	■ Input gain control too high - lower accordingly (closer to 4.0 volt setting). ■ Verify speaker loads >2 ohms on all channels (non-bridged mode). ■ Verify the mounting location allows for free air movement around the amp. Preferably, the amp should be mounted with fins up and down so rising heat moves quickly away from amp.
Amplifier turn-on/turn-off pops or noises	■ "turn on race" - disconnect trigger from radio and turn on/off via a wire jumper to power terminal. If noise goes away, the radio is turning on/off too slowly. This is radio problem and can only be corrected with outboard turn-on delay relay system. ■ Radio "thump" - disconnect the RCA input lines to the amp and turn on/off via radio trigger. If noise goes away without RCA lines connected, the radio is sending pops out through RCA lines. This is a radio problem and can only be corrected with outboard turn-on delay relay system.
Cracking noises on AM/FM radio but not on tape or cd.	■ Ensure the problem is "radiated noise" by placing a portable FM radio near the car engine. If noise is picked up, then it is a vehicle problem and not your system. Research to isolate the source and properly shield or bypass. ■ Are spark plugs and wires > 3 years old? These can often radiate substantial noise when old. ■ Verify the engine block has a good ground connection to chassis ground. ■ Verify the engine compartment hood is grounded to vehicle chassis via a braided grounding strap.
Whining noise, engine running, varies in pitch or loudness with engine speed, AND varies with radio volume control setting ***(this is generally a RADIO installation problem)***	■ Verify all power and ground connections are clean at radio. ■ Re-route radio power and ground so they are sourced from same connections back at amplifier (this is called a "common" ground). ■ Check all ground connections to ensure clean surfaces that have all paint removed and also not oxidation buildup over time. ■ Verify there is some kind of power filtering choke assembly at back of radio. If not, install one.
Whining noise, engine running, varies in pitch or loudness with engine speed, BUT, DOES NOT vary with radio volume control setting ***(this is generally an amplifier installation problem)***	■ Check battery ground connections at chassis are clean and tight, scraped free of oxidation, paint, and grease. ■ Re-route radio power and ground so they are sourced from same connections back at amplifier (this is called a "common" ground). ■ Bypass all equipment between radio and amp (e.g., equalizers) directly connecting radio. If noise goes away, signal processor has problem. ■ Check for signal level "ground loops" - disconnect the outer shield of the RCA cable at one end of the cable (e.g., radio end). If noise goes away, modify cables accordingly. There are voltage differences at the ground connections of the components and these are NOT correctable any other way than such shield cutting or an outboard "ground loop isolator" which is a small transformer.

Limited Warranty Information (United States Only)

Robert Bosch Corporation warrants new Blaupunkt car audio products it distributes in the United States through authorized Blaupunkt dealers, or which are imported as original vehicle equipment by the automobile manufacturer, to be free from defects in material and workmanship, in accordance with the following:

For twelve (12) months after delivery to you, the original consumer purchaser, we will repair or at our option replace at no charge to you any car audio product which, under normal conditions of use and service, proves to be defective in materials or workmanship. However, this warranty does not cover expenses incurred in the removal or reinstallation of any car audio product, whether or not proven defective, and does not cover products not purchased from an authorized Blaupunkt dealer. This warranty is limited to the original consumer purchaser and is not transferable. Repaired and replacement car audio products shall assume the identity of the original for purpose of this warranty and this warranty shall not be extended with respect to such products.

To obtain performance of this warranty, contact the nearest Blaupunkt authorized repair facility or our nearest office. A dated purchase receipt or other proof that the product is within the warranty period will be required in order to honor your claim. Carefully pack the unit and ship prepaid to the servicing location. For further information, write to the Robert Bosch Corporation, 2800 South 25th Avenue, Broadview, Illinois, 60153, attention Blaupunkt Customer Service Department or call 1-800-266-2528.

Specifically excluded from this warranty are failures caused by misuse, neglect, abuse, improper operation or installation, dropping or damaging, unauthorized service or parts, or failure to follow maintenance instructions or perform normal maintenance activities. Normal maintenance activities for car audio products include but are not limited to cleaning and other minor maintenance activities and adjustments that are outlined in the owner's manual or that are normally required for continued proper operation. Also excluded from this warranty is the correction of improper installation and the elimination of any external electromagnetic interference. This warranty sets forth your exclusive remedies with respect to the products covered by it. We shall not be liable for any incidental, consequential, special or punitive damages arising from the sale or use of any Blaupunkt car audio products, whether such claim is in contract or tort. No attempt to alter, modify, or amend this warranty shall be effective unless authorized in writing by an officer of Robert Bosch Corporation.

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ROBERT BOSCH CORPORATION
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BROADVIEW, IL 60153
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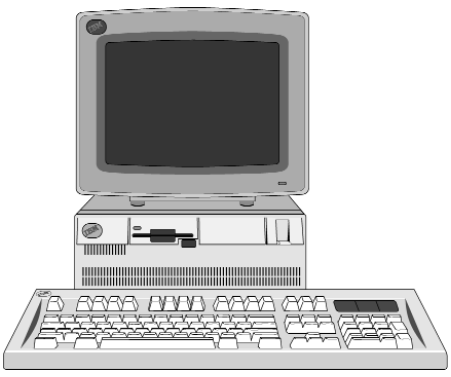
Blaupunkt Technical Support

These amplifiers are designed to install quickly and easily into most vehicles. Should you experience installation problems, we will make all reasonable efforts to help you, the end purchaser or Installation Technician, to competently install these components. Before calling us please carefully review this owners manual for the answers to your questions.



Due to the limited print space of this owners manual, we also offer additional information regarding installation and systems on our Internet site. Via a standard Internet connection through a local Internet Service Provider or other providers (e.g., America Online), connect to our web site at the following address: http://www.blaupunkt.com. On this site we offer technical information on system design, vehicle integration, product fit guides where possible, and extensive information on loudspeaker design and installation. For the more adventuresome builder, we also offer our “BlauBox” computer program which assists in designing subwoofer enclosures. This program is FREE to down load and use. We also “link out” to other sites that provide additional theory and technical support for the consumer and the technically interested.

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